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**EXECUTIVE SUMMARY: A POLITICAL-  
ECONOMIC GAME EXPLORING SOVIET  
PLAN FORMULATION DURING  
POSTATTACK RECOVERY**

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Final

December 1978

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SSC-TN-4886-2

By: M. Mark Earle, Jr.  
Holland Hunter  
Herbert S. Levine  
Charles H. Movit

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Prepared for:

Defense Advanced Research Projects Agency  
1400 Wilson Boulevard  
Arlington, Virginia 22209

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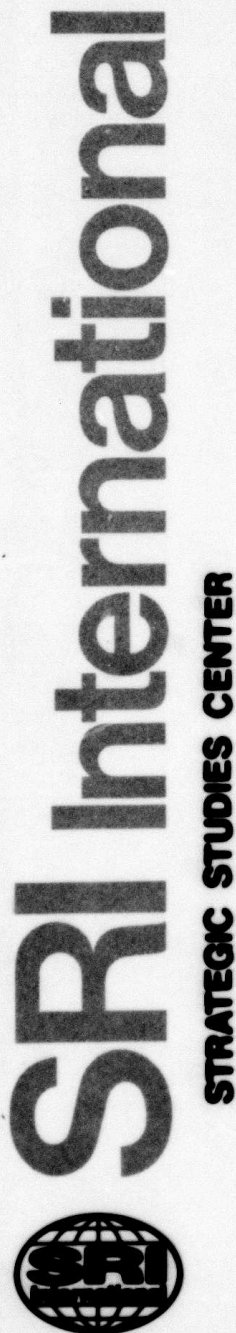
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# **THE SOVIET CONSTRUCTION SECTOR: IMPLICATIONS FOR RECOVERY ANALYSIS**

**Final**

**December 1978**

**Technical Note  
SSC-TN-4986-3**

**By. Charles H. Movit**

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### ABSTRACT

This technical note describes practices in the Soviet economy regarding the organization, administration, planning and financing of construction activity, as well as performance problems of the construction sector and reform initiatives aimed at solving them. Based on this system description, implications are drawn for the potential organization of construction activity in a postattack environment and the impact on recovery processes.

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## FOREWARD

This technical note presents a description of the current state of organization, planning, finance, and performance of the Soviet construction sector. Implications are drawn from this material for the potential postattack environment. The activity of the construction sector is critical to the economic growth and performance of the USSR in peacetime and would be the key to reconstruction and expansion of capacity in recovery. The description of construction performance and organization is a complex task and it is hoped that this report can make a contribution to the available literature.

The author would like to acknowledge the valuable assistance of Herbert Levine and Holland Hunter and the advice of Martin Kohn, Willard Smith and William Trimpin on available source material.

Richard B. Foster  
Senior Director  
Strategic Studies Center

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## I INTRODUCTION

The construction sector in the USSR, as in any industrial economy, plays a central role in the process of economic growth. It is the link between the allocation of investment and the realization of new productive capacity. Its performance shapes both investment decisions and the performance of the economy as a whole. In postattack recovery, the construction sector is a key to the ability to restore production activity and to the attainment of long-term recovery goals.

There is, however, no major book in English on the Soviet construction industry encompassing its administration, planning, performance and problems, while there are such studies of other Soviet economic sectors. Perhaps part of the reason is the complexity of organizational and planning arrangements for this sector. The complexity is due to the difficulties, within the framework of central planning, of coordinating an activity which must cope with a multitude of very different tasks and the objects of which have performance periods and results extending beyond the horizon of the planning year. Because the end-products of construction activity are concerns which cut across bureaucratic lines as well as geographical boundaries, the organizational principles are quite different from much of the rest of the economy. The problems of control by the center and incentives which elicit appropriate response on the part of peripheral units are multiplied.

Performance problems in construction are a common target of criticism by Soviet economists and planners. Moreover, these same problems persist despite their open recognition and attempts to adjust institutional structures. Important problems include poor quality of work, persistence of labor-intensive methods and escalating costs. The most chronic complaint, however, concerns the very high stock of



unfinished construction projects that is unabated despite numerous attempts at remedies. It is recognized widely that this situation has served as a significant drag on the growth of the economy.

Construction activity must play an even more vital role in post-attack recovery, both for reconstruction and new investment. The sources of inefficiency in construction need to be examined for their relevance to the recovery environment. In much of SRI's work on analysis of the potential Soviet postattack economic environment, focus has been directed to the continuity of economic processes. It is important then to achieve an understanding of the organizational structure and planning of construction, as has been sought for industry, in order to consider postattack structures. Even if there is significant variation from the peacetime framework, it is still important to know the starting point. As the analysis presented below will indicate, the experience of the Soviet approach to construction activity can be related to the nature of the tasks with which it is presented, and thus implications drawn for the postattack environment.

In the discussion which follows, descriptive material is presented in the early chapters, while analysis of the implications of that information is mainly reserved for the last two chapters. The descriptive material is essential, but apologies should be offered to the reader for its complexity and difficulty encountered in its assimilation.

The two major activities dealt with in the discussion are investment and construction. Investment activity is the broader term involving the planning and design, construction and installation work and expenditures on production equipment for the facility. Construction-assembly work is, on the other hand, the real measure of the activity of construction organizations. Unfinished construction is the value of construction work put in place but not transferred

to the books of the client enterprise (usually not including the value of production equipment delivered but not operating). The commissioning of a construction project can be explained by a literal translation of the Russian term--introduction into activity. In some accounts this stage represents the end of the investment process, while the broader view treats the following period of assimilation of capacity (achievement of rated output) as completing the cycle.

The next chapter treats the current organization and administration of these activities with a brief consideration of historical development. Following is a description of the planning and financing processes. Performance problems, their sources and attempted solutions are presented and in the last chapter, implications drawn for the post-attack environment.

## II ORGANIZATION AND ADMINISTRATION OF CONSTRUCTION

In this chapter the details of the current organization and administration are presented with brief consideration of historical developments. It should be noted here that the discussion is dominated by the complex nature of the organization, inconsistencies in various aspects, and the mixed pattern of trends in institutional change.

The organization of construction activity and its administration have, in the USSR, undergone considerable revamping, particularly in the last two decades, both in the attempt to increase the effectiveness of construction work itself and to improve the results of the capital investment process as a whole. This effort looms especially important in the Tenth Five-Year Plan period when central planners have focussed attention on the decreasing return in terms of economic growth from capital investment. Of particular note has been the failure of the construction industry to substantially reduce the stock of unfinished construction which grew rapidly under the previous plan. In 1970, the final year of the Eighth Plan, the volume of unfinished construction (state and cooperative enterprises without collective farms) was about 52.5 billion rubles (actual cost to the builders) which was 73 percent of the volume of capital investment in those sectors for that year. In 1976, the first year of the Tenth Plan, the volume of unfinished construction was 84.1 billion rubles, 80 percent of 1976 volume of capital investment in state and cooperative enterprises and organizations (without collective farms).<sup>1</sup> Two of the most prestigious observers of Soviet capital construction, Ya. Kvasha and V. Krasovskiy note that the level of efficiency in the Soviet capital investment process in the mid-1970s was quite unsatisfactory--actual construction periods for industrial enterprises as a whole exceeded the normed periods by 1.5 to 2 times and actual cost exceeded original estimates by 1.4 to 1.6 times.<sup>2</sup>

<sup>1</sup> Central Statistical Administration, Narodnoye khozyaystvo SSSR za 60 let: Yubileynyy statisticheskiy yezhegodnik, Moscow, 1977, p. 447.

<sup>2</sup> Ya. B. Kvasha and V.P. Krasovskiy, "Razvitiye kapital'nogo stroitel'stva i povysheniye effektivnosti kapital'nykh vlozheniy" Izvestiya Akademii nauk, Seriya ekonomicheskaya, No. 6, 1976, pp. 52-53.

The organization and reorganization of the administration and management of construction activity has played a primary role in Soviet attempts to improve the performance of the construction industry. Early efforts to improve construction performance centered on the development of contractual relationships between the organization carrying out the construction and the production organization which used the structure. Two alternative economic mechanisms have been available for the accomplishment of construction tasks by industrial ministries and their enterprises--by means of their own activity (khozyaystvennyy sposob) and contractual means (podryadnyy sposob). While the first method predominated in the early plan period until just before the Second World War, efforts by the central planners, from the First Five-Year Plan on have succeeded in a steady trend toward contractual relations in construction activity. Thus while contract construction accounted for only 36 percent of the volume of construction work during the First Five-Year Plan (1928-1932), by 1965 the figure reached 87 percent and by 1976, 92 percent.<sup>1</sup> This trend toward contractual construction work was intended to improve the efficiency of the construction process by creating permanent organizations devoted to construction. It also provided increased visibility of flows involved in construction which improved the ability of the center to monitor the critical capital investment process.

While construction activity was gradually being transferred in the 1930s from the industrial enterprise (i.e. integrated organizationally with the production unit) to the construction trust which performed under contract to the new or expanding enterprise, the administration of the construction units remained in the hands of the branch ministries for which the construction was performed. In 1939, a number of construction trusts were united under the Commissariat of Construction, which was intended to be the prime organizer of heavy industrial construction, but other commissariats continued to maintain chief construction administrations to carry out their own building programs.<sup>2</sup> Further organizational

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<sup>1</sup> Central Statistical Administration, op. cit., p. 228.

<sup>2</sup> Joseph S. Berliner, The USSR Construction Industry, Council for Economic and Industry Research, Washington, 1955, p. 11.

reform came in 1946, when centralization of construction activity was asserted by the expansion of the construction commissariat as the Ministry for Construction of Heavy Industrial Enterprises through transfer of trusts from other branch ministries, the establishment of ministries for fuel enterprise construction, military and naval construction, and in 1947, two chief administrations of high priority projects attached directly to the Council of Ministers (machinebuilding plant and petroleum and gas works construction).<sup>1</sup> In light of continued dissatisfaction with the performance of construction work, continued centralization and decentralization of ministerial responsibility for the construction sector took place in the early 1950s and by 1954, six separate ministries of construction could be identified, together with Gosstroy, the State Committee on Construction Affairs of the Council of Ministers, established in 1950 to coordinate their activity and press for reduction of construction costs.<sup>2</sup>

The ministerial system for the administration of construction was dismantled along with most of the economic ministries in the reform of 1957. With the exception of the Ministry of Medium Machinebuilding supposed to produce nuclear weapons, and the temporary exception of the Ministry of Electric Power, economic ministries were abolished in July 1957. State committees provided some research and planning activities for specific branches, but did not control enterprises. Most of the central functions of the ministries fell to Gosplan (the State Planning Committee), while enterprise supervision was accomplished by appropriate sovnarkhozy--regional economic councils.<sup>3</sup> This reform, aimed at breaking up the "empire-building" of the former ministries, gave over the admin-

---

<sup>1</sup> Berliner op cit., p. 12.

<sup>2</sup> Ibid., pp. 13-14.

<sup>3</sup> For a detailed description of the sovnarkhoz reform see A. Nove, The Soviet Economy: An Introduction, Praeger, New York, 1969, pp. 72-82.

istrative control of construction trusts to the sovnarkhoz of the region in which they operated, while newly created republic ministries of construction supervised specialized, interregional construction activity (or, in some cases, where the republic and economic region were contiguous). By 1960, only about 20 percent of all construction work in the state sector was performed by organizations under control of all-union (central) authority.<sup>1</sup>

It became obvious in the course of the reform, that the evils of ministerial empire-building were being replaced by regionalism. This was particularly serious in regard to construction activity, given the recurring observation of divergence between local and central interests in capital investment as a cause for the proliferation of unfinished construction. In 1962, therefore, three years before the ministerial system was restored for the rest of the economy, construction trusts were transferred from the control of sovnarkhozy to the republic ministries of construction and Gosstroy was converted to a union-republican organ<sup>2</sup> with strengthened control over the approval of construction project lists and the design-cost estimating process.

In 1967, the Soviet construction sector took on the unique mix of territorial and branch lines of administration which is still in effect. Specialization along both territorial and branch lines had existed to some extent in the pre-1957 set up, since several specialized construction

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<sup>1</sup> Martin J. Kohn, The Stock of Unfinished Construction in the USSR; 1955-65: An Efficiency Problem in a Centrally Planned Economy, Yale University, Doctoral Dissertation, 1970, pp. 311-312.

<sup>2</sup> Kohn, op. cit., pp. 313-314. Gosstroy was created in 1950 as an all-union body. In the union-republic scheme of organization, the union body has corresponding bodies at the republic level which control their subordinate organizations in the respective republics. The republic level bodies are subordinate both to the union-level body and the republic council of ministers.



ministries controlled chief administrations of construction (glavki) with territorial differentiation, for example, a chief administration charged with construction of heavy industrial enterprises in the western USSR. The 1967 reform, however, undertook to eliminate duplication of effort by systematically allocating responsibility among construction ministries for general construction work according to the branch character of industry dominating particular territorial-administrative divisions.

Of the eleven separate union-level ministries responsible for various aspects of construction activity in the USSR, three union republican ministries are responsible for most major, general industrial construction. They are organized on the branch-territorial principle--a dilution of the branch organizational principle which is the organizational basis of other parts of the Soviet economy. The three ministries are the Ministry of Construction of Heavy Industrial Enterprises (Mintyazhstroy--primarily for the ferrous and non-ferrous metals industries), the Ministry of Industrial Construction (Minpromstroy--for the chemical, petrochemical, and petroleum refining industries) and the Ministry of Construction (Minstroy--for the machinebuilding, light, food and other branches of industry).<sup>1</sup> In any one territorial-administrative unit of the USSR (oblast or kray) only one of these three ministries, either at the union or republic level, has construction organizations subordinate to it (see paragraph below). The allocation of the territorial unit to one of the three basic construction ministries is determined by the specific nature of the majority of industrial enterprises located in it. Minstroy controls construction in territorial units characterized by multibranch industrial activity.<sup>2</sup> It should be noted that all construction in the oblast or kray, regardless of its character (unless it falls to one of the more specialized ministries) is accomplished by construction trusts subordinate to only one of these three ministries. According to this principle, then,

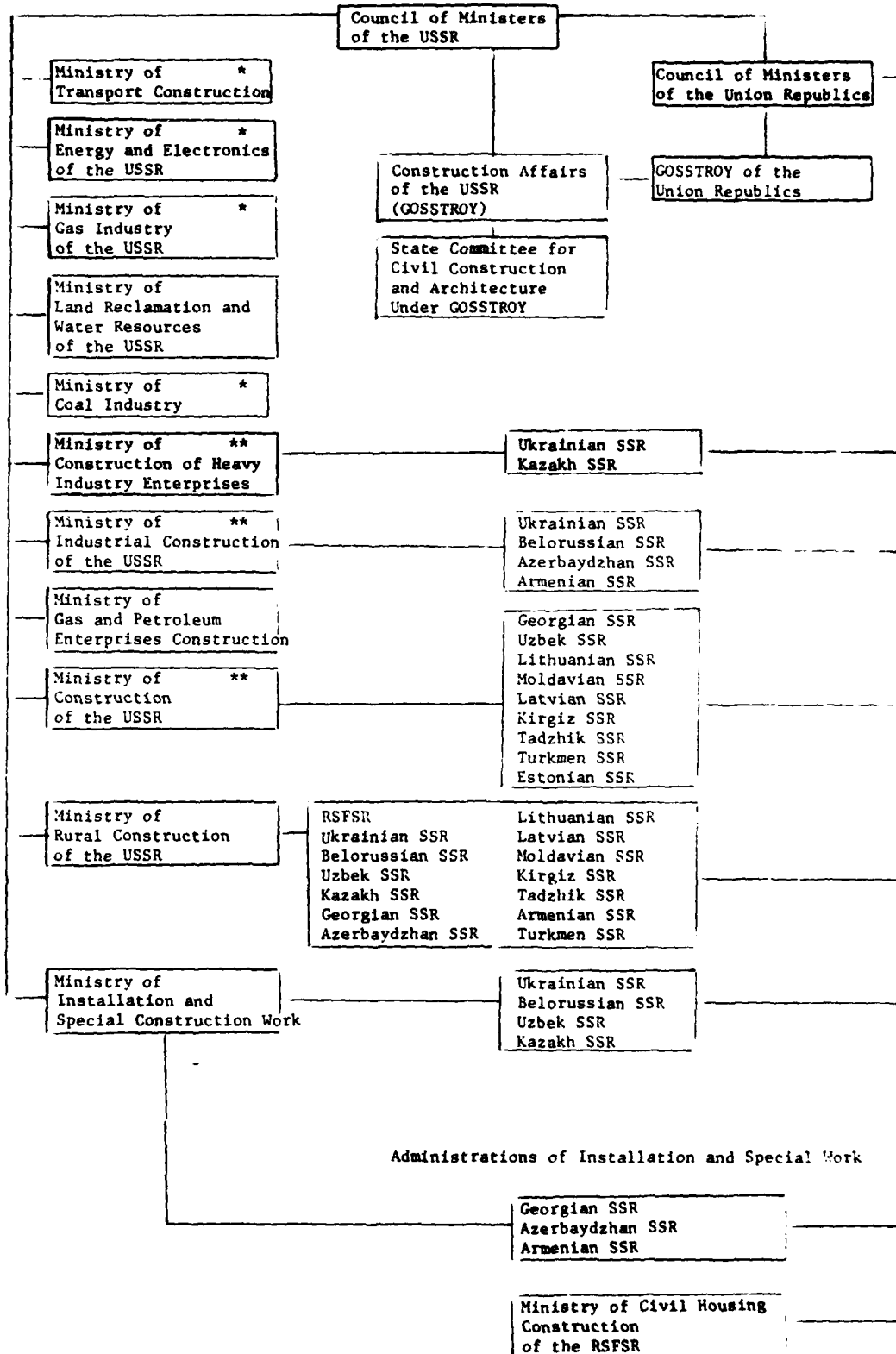
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<sup>1</sup> B. Ya. Ionas and S.N. Reynin, eds., Ekonomika stroitel'stva, "Vysshaya shkola" Press, Moscow, 1977, pp. 24-29

<sup>2</sup> F. N. Telichkin, Planirovaniye i effektivnost' stroitel' nogo proizvodstva, "Budivel'nik" Press, Kiev, 1976, pp. 10-13

TABLE 1

**PRINCIPLE STRUCTURAL SCHEME OF THE ADMINISTRATION  
OF CONTRACT CONSTRUCTION IN THE USSR**



#### NOTES TO TABLE

- \* In the makeup of these ministries are construction-assembly organizations which undertake, respectively, structures for transport, thermal and gas electric power stations, main-line oil and gas pipelines, land reclamation and water management, and coal mines.
- \*\* These ministries directly manage construction on the territory of the RSFSR. To them are subordinated contracting organizations in autonomous republics, krays and oblasts, Glavmosstroy, Glavmosoblstroy, Glavkievstroy, Glavlengradstroy, Glavtyazhstroy.

Source: Telichkin, op. cit., pp. 12-13

Please note that the republics named in the table indicate the republican level ministries corresponding to the union-republic construction ministries. Their double subordination (to the union-republic ministry in Moscow and to the republic councils of ministries) is indicated. Except for the RSFSR those republics listed are the only territory of concern to the three general construction ministries. The Ministry of Installation and Special Construction Work is concerned with the entire USSR; where no republic level ministry is formed, administration of the union level ministry are responsible.

construction organizations building warehouses for retail trade in an oblast allocated to the Ministry of Heavy Industrial Construction would be subordinated to that ministry.

In nine union-republics, construction of industrial enterprises is solely controlled by republic-level ministries of Minstroy.<sup>1</sup> In the Belorussian, Azerbaidzhani, and Armenian Republics and 20 oblasts of the Ukraine, all basic construction trusts are subordinate to Minpromstroy republic-level ministries. The remaining oblasts of the Ukraine and Kazakhstan are allocated to Mintyazhstroy republic-level ministries.<sup>2</sup>

The Russian SFSR is a special case. The union-levels of the three basic construction ministries directly control construction activity in various of the RSFSR's krays, oblasts and autonomous republics--24 under Minstroy SSSR, 21 under Mintyazhstroy SSSR, and 25 under Minpromstroy SSSR. There are also two independent republican construction ministries in the RSFSR: Housing and Municipal Construction and Highway Construction.<sup>3</sup>

In addition to the three basic industrial construction ministries, there are specialized all-union and union-republic ministries for construction which are not organized on the branch-territorial basis. These include: the Ministry of Installation and Special Construction Work (union-republic, doing specialized work on a subcontract basis),<sup>4</sup> the Ministry of Construction of Enterprises of the Oil and Gas Industry (all-union) and the Ministry of Transport Construction (all-union). There are also specialized construction organizations subordinate to the Ministries of the Gas Industry, (all-union), Coal Industry (all-union),

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<sup>1</sup> These are the Georgian, Uzbek, Lithuanian, Moldavian, Kirghiz, Tadzhik, Turkmen, and Estonian SSRs.

<sup>2</sup> Telichkin, op. cit., p. 13.

<sup>3</sup> Ibid.

<sup>4</sup> The Ministry of Installation and Special Construction Work (Minmontazhspeystroy) is charged with administering work, usually accomplished on a subcontract basis, of installing specialized equipment in facilities constructed by (that is shell, foundations for equipment, etc.) organizations of other ministries.

Energy and Electric Power Stations (union-republic), and the Ministry of Melioration and Water Conservation. Much of the housing and communal construction is accomplished by construction organizations subordinate to executive committees of local Soviets and in major urban areas, chief construction administrations are formed under local authority to supervise this work--Moscow, Leningrad Kiev, Tashkent and Moscow Oblast.<sup>1</sup>

The basic construction organization in the USSR is the trust. The two major types of construction trusts are the general construction trust (obshchestroitelnyy trest) and the specialized trust (spetsializirovanny trest). The general construction trust usually acts as the general contractor for a project and employs the specialized trust as a subcontractor, usually for construction requirements beyond the stage of the completed shell. Trusts are also differentiated by the territorial span of their activity. The trest-ploshchadka or site trust is concerned with only one construction site. The city trust (trest gorodskogo tipa) operates only within one city and the territorial trust within one or several specific rayons. There are also specialized trusts classified as Union or republic trusts operating in a number of rayons throughout the country or specific republic.<sup>2</sup> Trusts organize construction administrations for each of their ongoing projects in the case of territorial or city trusts. The smallest subdivisions of the trust are the construction units (stroitel'-nyye uchastki) which are responsible to the construction administration (or directly to the trust in the case of the trest-ploshchadka) for par-

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<sup>1</sup> Ibid. and L. G. Dikman, Organizatsiya, planirovaniye i upravleniye stroitel' nym proizvodstvom, "Vysshaya shkola" Press, Moscow, 1976, pp. 344-345. The urban construction glavki are Glavmosstroy and Glavmosinzhstroy, Glavleningradstroy and Glavleningradinzhstroy, Glavkievstroy, Glavmosoblstroy, and Glavtashkentstroy (subordinate to the Uzbek Council of Ministers)

<sup>2</sup> Dikman, op. cit., p. 348.

ticular aspects of the current construction project. The trust can also include separate units concerned with mechanical equipment (bazy mekhanizatsiya) and production enterprises supplying materials, e.g. pre-fabricated concrete structures.<sup>1</sup>

Trusts and Construction administrations are also classified by volume of construction-installation work performed annually. Depending on the category in which it is classified are the organization's staff size, wage fund, and wage scales for managerial and engineering-technical workers.<sup>2</sup> When calculating the organization's category, the volume of work is adjusted by a coefficient representing the complexity and labor intensiveness in its specific work. The categorization is for trusts in the case of general contracting and for construction administrations in the case of specialized subcontract work.<sup>3</sup>

Three major aims in recent organizational changes in the construction sector can be observed--concentration, specialization, and combination.<sup>4</sup> Concentration relates to the elimination of construction organizations with small annual volumes and the creation of large scale organizations. From 1972 to 1976 the number of organizations with an annual volume of work performed less than 1 million rubles decreased from 22 to 19 percent of the total number while those with a volume over 3.2 million rubles increased from 20 to 25 percent of the total in all categories.<sup>5</sup> Construction organizations with an annual volume of work

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<sup>1</sup> Telichkin, op.cit., p. 15.

<sup>2</sup> Dikman, loc. cit.

<sup>3</sup> Telichkin, op.cit., p. 16.

<sup>4</sup> Dept. of the Economics of Industry and Basic Industrial Production of the Part-time Higher Party School under the CPSU Central Committee (hereafter Department of Economics of Industry), Ekonomika i organizatsiya stroitel'stva, "Mysl" Press, Moscow, 1975, pp. 14-16.

<sup>5</sup> Central Statistical Administration, op.cit., p. 453 and Narodnoye khozyaystvo SSSR v 1972g., Statistika Press, Moscow, 1973, p. 495.



below 1 million rubles are deemed to be below the minimum level for effective operation due to lower output per worker and higher administrative expenditures relative to output.<sup>1</sup> Specialization refers to the creation of construction organizations specifically equipped, in terms of labor force and capital, for activity related to construction for a particular branch of industry or a particular aspect of the construction process, especially in finishing work. These two trends taken together should result in fewer (but larger) general contracting organizations and an expanded number of specialized subcontractors.<sup>2</sup> The creation of construction combines is analogous to the association (ob"yedineniye) movement in the organization of productive enterprises in industry. Construction combines unite a number of formerly independent construction and production enterprises under a single management, replacing contractual relations with internal management and supervision of production and construction flows. There are three organizational forms of combines for housing construction (domostroitel'nyy kombinat--DSK) and plant construction (zavodostroitel'nyy kombinat--ZSK):

- Moscow type; all plants and construction organizations each on an independent accounting balance
- Leningrad type; plants subject to internal accounting only with a unified balance for the combine as a whole (as a construction organization)
- Mixed type; production enterprises each on an independent accounting basis, but with a unified balance for the construction activity of the combine.

While combines may be general contractors, the greatest number of combines that have been formed are involved in specialized subcontracting work.<sup>3</sup>

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<sup>1</sup> Telichkin, loc. cit.

<sup>2</sup> Ibid., pp. 16-20.

<sup>3</sup> Ibid., p. 21.

Despite the identification of these trends, however, the construction sector consists of a multitude of differing organizational patterns deemed appropriate for their particular tasks. Thus the complex features of planning and financing their work, as described in the following chapter.

### III PLANNING AND FINANCING CONSTRUCTION ACTIVITY

The following description of the planning and financing of construction reflects normative literature on Soviet practice as prescribed. The performance evaluation in the following chapter will indicate that these procedures are flexible, and in fact, often violated.

The annual plan for capital investment is drafted by Gosplan on the basis of the five-year plan targets and the actual development of the economy from the inception of the five-year plan period. The ministries are informed of annual plan targets for capital investment by Gosplan no later than May of the preceding year; the targets are then subject to revision, the revised targets taking the force of law after approval by the Supreme Soviet (usually in December).<sup>1</sup> The approved plan specifies the total sum of capital investment in the state sector--since 1971, this has included both centralized (primarily financed from the state budget) and decentralized (financed from the enterprise's funds and credits) capital investment.<sup>2</sup> Beginning in 1977, unified plans for capital investment were to be confirmed which do not differentiate between volumes of investment by source of financing.<sup>3</sup> This planned volume of capital investment is balanced against available labor and material resources, financial means, and capacities of construction organizations to ensure that the volume is feasible and consistent with related targets.

The basic indicators for capital investment in the annual plan include:

- productive capacity (and housing space and "non-productive" facilities) to be commissioned

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<sup>1</sup> K. G. Zullas, Finansirovaniye i kreditovaniye kapital'nykh volzheniy, "Vishcha shkola" Press, Kiev, 1976, p. 28.

<sup>2</sup> G. A. Khmel'nitskiy and K. G. Federenko, Stroitel'stvo : finansy, effektivnost', "Budivelnik" Press, Kiev, 1977, p. 19.

<sup>3</sup> Zullas, op. cit., p. 10.

- increase in fixed capital
- volume of investment and construction-assembly work
- volume of incomplete construction at the end of the year<sup>1</sup>

These targets relate to the activity of the ministries as customers in the construction process. The annual plan also provides plan targets for the construction organizations which in aggregate corresponds to the construction-assembly component of the capital investment plan targets.<sup>2</sup> Plan targets are provided for construction organizations for the following indicators:

- productive capacity to be commissioned and individual projects to be completed in accordance with confirmed drafts and project lists
- volume of construction-assembly work to be performed, by project or completed construction phase, which must be delivered to the customer within the plan year (at estimated cost)
- total volume of work (with distribution by customer), whether by their own work force or by subcontract
- total wage fund for the year
- profits and payments to and receipts from the budget
- volume of centralized investment
- production capacity to be commissioned and capital stock put in place on account of centralized capital investment

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<sup>1</sup> Department of Economics of Industry, op. cit., pp. 46-47.

<sup>2</sup> M.F. D'yachkov, Analiz khozyaystvennoy deyatel'nosti v stroitel'stve, "Finansy" Press, Moscow 1976, p. 11.

- assignments in relation to the development and modernization of construction activity
- volume of deliveries of materials and machinery and equipment.<sup>1</sup>

The three primary indicators for fulfillment by the general-contracting construction organization are commissioned productive capacity, volume of construction work performed, and profits (the organization is responsible only for its own work, not the work of its subcontractors).<sup>2</sup>

The consistency of plans for construction work, plans for capital investment, and plans for delivery of material and machinery depend on the process of compiling and approving (confirming) "title lists" (titulnyye spiski).<sup>3</sup> A title list for construction projects is compiled on the basis of design documentation and estimates for the projects. It specifies targets for commissioning of productive capacity, fixed capital to be put in place, capital investment expended and construction-assembly work by project and by year for the entire period of construction according to established norms for construction periods. Since 1971, title lists have served as unalterable planning documents for the entire period of construction in the case of production facilities, and on the basis of the information provided in them, construction contracts are concluded, fondy (not funds, but rights to purchase) for materials and technical support are allocated, and financing and credit arrangements are determined.<sup>4</sup>

Title lists are prepared by the customers of the construction sector (that is, the organizations to which capital investments funds

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<sup>1</sup> Department of Economics of Industry, op. cit., pp. 43-44.

<sup>2</sup> Ibid., p. 45. Commissioned productive capacity relates to enterprises or subelements delivered to the client and in operation. Planned profit is included in the evaluation of objects of construction.

<sup>3</sup> Title lists are lists of projects (by element) included in a capital investment plan.

<sup>4</sup> Zullas, op. cit., pp. 35-36.

will be allocated) with the help of construction organizations. The confirmation of an organization's title list by the appropriate supervisory institution means, in effect, that the projects appearing on the list will be included in the plan for capital investment. The right to confirm title lists is divided among various organs, depending on the economic significance and character of the construction, estimated cost, affiliation of the customer, whether or not imported equipment is involved.<sup>1</sup> All construction projects exceeding 3 million rubles (estimated cost) must be confirmed for inclusion in the title list by the USSR Council of Ministers.<sup>2</sup> A table indicates the correlation of the characteristics of a construction project and the confirming organ (Table 2). Title lists for construction financed by decentralized means are confirmed as established by the appropriate USSR ministries and union-republican councils of Ministers. Production associations have the right to confirm title lists for expansion of existing facilities from their own funds and other decentralized sources, regardless of estimated cost, and construction of housing and socio-cultural facilities (other than those facilities specifically requiring higher authority) from centralized capital investment.<sup>3</sup> This confusing maze of confirming organizations serves to illustrate that despite the large share of centralized financing of investment and the role of Gosplan in approving major undertakings, within the limits of allocation by ministry and union republic of investment totals, the authority to initiate smaller construction projects is widely disbursed. This fact will help to explain the problems in controlling the dispersion of investment resources faulted by critics of the construction sector's performance.

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<sup>1</sup> Ibid., p. 32.

<sup>2</sup> Departmen. of Economics of Industry, op. cit., p. 48.

<sup>3</sup> Zullas, op. cit., p. 35.



TABLE 2  
CONFIRMATION OF TITLE LISTS

<u>Project Characteristics</u>	<u>Confirming Organ</u>
I Projects of Productive Significance	
1. Newly beginning projects	
-- with an estimated cost above 3 million rubles	Council of Ministers of the USSR at the suggestion of Gosplan.
-- 1 to 3 million rubles	All-union ministries, some union-republican ministries for projects within their systems; Councils of Ministers of union-republics for projects included in the systems of republican ministries, the remaining union-republic ministries, and for locally subordinated enterprises, at the suggestion of union-republic Gosplans.
2. Continuing projects in the system of USSR ministries	
-- ferrous and non-ferrous metallurgy, chemicals, petrochemicals, petroleum refining, coal and gas, power, and oil and petroleum products transport with an estimated cost of 25 million rubles or higher	USSR ministries, in agreement with USSR Gosplan.
-- other branches of industry and other sectors with estimates of 5 million rubles and up	(same as above)
-- remaining projects in this system	As established by the ministries.

3. Continuing projects of republican ministries, locally subordinate enterprises, and union-republican ministries not specifically exempted

-- with estimated cost over 5 million rubles

Councils of Ministers of union-republics by agreement with the USSR Gosplan.

-- below 5 million rubles

As established by the Councils of Ministers of the union-republics.

4. Projects involving foreign licenses or complexes of imported equipment

-- newly beginning, regardless of estimated cost

USSR Gosplan.

-- continuing, 5 million rubles and up

USSR Ministries and Councils of Ministers of union-republics by agreement with Gosplan USSR.

-- continuing, under 5 million rubles

USSR Ministries and union-republic Councils of Ministers.

## II Of "Non-Productive" Character

1. Housing, social and communal facilities and retail trade, regardless of estimated cost

As established by the USSR Ministries and Councils of Ministers of the union-republics furnishing the investment funds.

2. Administrative building (other than for units of the system of USSR ministries) and mass entertainment, sports and cultural facilities

-- newly beginning up to 1 million rubles

Councils of Ministers of union-republics; USSR Ministries when built for their enterprises located outside cities.

- |   |   |
|---|---|
| -- newly beginning, 1 million rubles and higher           | The same organs, but by agreement with USSR Gosplan.                        |
| -- continuing, regardless of cost                         | As established by union-republic Councils of Ministers and USSR Ministries. |
| 3. Facilities subordinate to the USSR Ministry of Culture |   |
| -- new, 1 million rubles and higher                       | Ministry of Culture USSR by agreement with USSR Gosplan.                    |
| -- new, up to 1 million rubles                            | USSR Ministry of Culture.   |
| -- continuing   | As established by this Ministry.  |
| 4. Administrative building, system of USSR Ministries     |   |
| -- new  | USSR Ministries with Gosplan USSR.  |
| -- continuing   | As established by the Ministries.   |

Source: Zullas, op. cit., pp. 32-35.

The plans for capital investment and construction-assembly work include confirmed title lists which distribute targets by construction project and major subelements. Since the process of confirmation of plans takes place at the end of the year preceding the plan period, results of the progress toward the fulfillment of the previous year's plan are only projected. Thus plan targets must be corrected after the initiation of the new annual plan. For industrial production targets, the process of revision is thought by Western analysts to be almost a continuous process, so that plan fulfillment reports may be expressed in percentages of plan targets which differ from those published prior to the plan period. Since 1970, however, revisions of plans for capital investment and construction-assembly work have been limited by statute. Plan targets can not be altered after the 15th of February of the plan year, and only for the purposes of:

- increasing targets to account for underfulfillment of previous targets on continuing and nearly completed projects at the expense of targets for newly initiated projects and those not scheduled for completion in that year
- by agreement with USSR Gosplan for necessary reallocation of capital investment between branches
- reassignment of limited investment resources to socio-cultural objects from reserves for housing and productive facilities.

Changes after this date may be made only in connection with transfer of projects from one organization to another or via augmentation of investment funds from the Reserves of the USSR Council of Ministers.<sup>1</sup>

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<sup>1</sup> N. S. Zenchenko and B. V. Gubin, eds., Planirovaniye khozyaystvennogo i kul'turnogo stroitel'stva, "Sovetskaya Rossiya" Press, Moscow, 1974, pp. 132-133.

A second type of title list is prepared by the client with the participation of the general contractor. This internal project title list (vnutripostroyechnyy titul'nyy spisok) is confirmed by the director of the plant under construction. It details, by element of construction work (ob'yekt), the estimated cost for the entire period, remaining work at estimated cost at the beginning of the year, the planned capital investment funding for the year, the planned unfinished construction (begun but not completed and transferred to the client's books), and the capacity to be commissioned in that year in physical and estimated cost terms. Where applicable, the targets are disaggregated into construction-assembly work and equipment. This document serves as a basis for financing the work and controlling its progress. It is submitted to the construction bank, Stroybank, where it is reviewed for consistency with the plan for capital investment, the title lists approved by higher authorities, and the plan for finance received by the bank from its upper echelon.<sup>1</sup>

All funds intended for the financing of capital investment in the state sector are deposited with Stroybank (with the exception of financing for investment by state farms deposited with Gosbank--the state bank). These include funds for financing centralized investment--allocations from the state-budget (in 1975, 47% of centralized investment) deductions for amortization, (21.6%), deductions from planned profits of enterprises, and resources obtained by enterprises through sales of surplus materials and equipment, etc., and sources for financing decentralized investment--funds formed from enterprise revenues (funds for the development of production, socio-cultural measures, and housing construction), and deductions from above-plan profits.<sup>2</sup> Allocations

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<sup>1</sup> Zullas, op. cit., pp. 56-61.

<sup>2</sup> Ibid., p. 68.

from the state budget can only be used to finance new construction, not for reconstruction or expansion of existing enterprises, and only in the instance that the period of recoupment of capital expenditures by the enterprise exceeds 5 years from the date of its commissioning and the industry's own funds are insufficient. For expansion and reconstruction of existing enterprises (as well as construction of new enterprises with recoupment periods less than five years), long term credits are available from Stroybank to supplement the enterprises own funds, which are deposited with the bank to finance construction.<sup>1</sup> Interest charges are paid at an annual rate of .5% during the construction period. Rates are reduced by 25-50% for early completion of construction. A charge of 1.5% per year of the total loan is made for the period in which actual construction exceeds the planned date of completion. Repayment of credit and interest is made from the profits of the commissioned enterprise and deductions for amortization. No capital charges are paid to the state on assets until bank credits used to obtain those assets are repaid.<sup>2</sup>

Accounts are maintained at the Stroybank by both customers and construction organizations. Into the customer's account are paid the annual volume of allocation from the state budget on a quarterly basis. From these payments and from the enterprise's own funds deposited with Stroybank, funds are transferred to the construction organization's account in compensation for work performed.

Reimbursement of construction organizations for work performed has been subject to reform, as it was identified as a significant cause of excess unfinished construction. Prior to 1971, periodic advances were paid into the accounts of construction organizations by clients to finance construction expenditures without the meeting of benchmarks in construction progress. In an

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<sup>1</sup> Ibid., pp. 68-72.

<sup>2</sup> Zullas, op. cit., pp. 120-130.



effort to prevent construction organizations from undertaking material-intensive tasks while neglecting finishing tasks for which the compensation was lower, new procedures were established for payments. Beginning in 1974, after a transition period, all accounts between customers and construction organizations could only be settled after the completion of a project element as a whole, or the completion of a stage (etap) of work. For all elements of construction with an estimated cost under 250 thousand rubles or a normed construction period up to one year, payment can be made only upon completion and official transfer to the client. For larger elements, or those requiring more than one year, stages are established in accordance with the character of the project. For productive enterprises in this category, three to five stage are established. Two stages relate to ground preparation and foundation work and the shell of the building with foundation for equipment (in some cases-all one etap). The latter three stages relate to installation of plumbing and electric fixtures and the production machinery and equipment. Should any of these stages be fulfilled by the construction organization for less than the estimated cost, the difference is remitted to that organization as profit and also goes toward plan fulfillment for construction work.<sup>1</sup>

It is interesting to note that while the new system of payments has been instituted, the reform did not carry over to the calculation of plan fulfillment for construction organizations, except on a limited, experimental basis. Plan fulfillment, on the basis of which bonuses are paid to managers, is calculated both on the basis of completed elements of construction and on the basis of construction work performed. In the case of most organizations, the fulfillment basis may be chosen which gives the higher level

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<sup>1</sup> Ibid., pp. 102-102.

of achievement. Thus performance objectives of most construction organizations relate to fulfilling the greatest value of construction work and not completions. The result of the divergence in the payment procedures and plan fulfillment calculations has been continued neglect of finishing tasks and an unsound financial standing for many construction organizations. Economic reform based on the so-called Belorussian experiment will be treated in the next chapter.

Title lists, plans, and contracts contain summary technical and economic data based on the design-estimate documentation (proyektno-smetnaya dokumentatsiya) supplied by customers by agreement with construction organizations. This documentation is also essential for the construction work itself.

Design-estimate documentation is developed by the system of design organizations which operate on a contractual basis. The client of the construction organization is also the client of the design organization. Design organizations specialized by branch of industry and economic sector are subordinated to the economic ministries. Certain design organizations are designated chief organizations in each branch and oversee the introduction of new technology and formation of technical policy for design in that branch. A separate group of design organizations, conglomerated into associations, are subordinated to Gosstroy (State Committee on Construction Affairs) USSR and are specialized by branch and by territory. These organizations develop regional plans, general plans for industrial complexes and approve preliminary design objectives (zadaniy na proyektirovaniye) developed by other organizations. While the branch design organizations serve as general designers, a series of more specialized design organizations address power, transport, and other areas of construction work. These are subordinated either to economic ministries or local authorities.<sup>1</sup> At the end of 1976, there

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<sup>1</sup> Ionas and Reynin, op. cit., p.168.

were 1727 design organizations serving construction clients.<sup>1</sup> Charges for design work are prescribed by a handbook and vary for each stage of the design process. On an average, design costs are about 2.5 percent of investment costs for industrial productions projects, or about 4 percent of the estimated cost for construction-assembly work.<sup>2</sup> The work of design organizations is also planned on the basis of title lists. Title lists for design work must be confirmed by Councils of Ministers of the union republics, with the agreement of Gosplan for new projects with a cost estimate exceeding 3 million rubles.<sup>3</sup>

After the suggestions to undertake construction projects are submitted to the ministry, a list of projects is formulated and designated for the development of the TEO (technical-economic substantiation) for each. This is usually accomplished by the chief design organizations of the branches. The TEO is the justification for the construction of the facility on the basis of general plans for territorial and branch development, estimated economic indicators of future enterprise performance, and technical production criteria, and on the basis of the identification of the necessary resources to accomplish the projects. The TEO are confirmed by the ministries with the agreement of Gosplan and Gosstroy USSR. After the approval of the project on the basis of the TEO, the client formulates the design objectives (zadaniye na proyektirovaniye) for the project and the construction passport (data about the construction sight) and contracts with the design organization to provide the design-estimate documentation (these earlier documents already include summary cost estimates and technical characteristics for the project).<sup>4</sup>

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<sup>1</sup> Central Statistical Administration, (1976), op. cit., p. 454.

<sup>2</sup> Ionas and Reynin, op. cit., p. 169-170.

<sup>3</sup> Zinchenko and Gubin, op. cit., p. 169-170.

<sup>4</sup> Dikman, op. cit., pp. 14-17.

Large projects involve two stages of design documentation. The first stage is the technical design (tekhnicheskiy proyekt), which is a multifaceted document including not only architectural and technical plans, but also labor plans, material requirements, equipment requirements, and cost estimates. The technical design must be reviewed and accepted by the general contractor for the project. Design organizations are required to utilize, whenever possible, existing standard designs (tipovyye projekty) developed by chief design organizations of the ministries and Gosstroy. These design-estimate documents must also be approved by the ministries and for important projects, by Gosstroy, which maintain panels of technical experts for this purpose. On the basis of approved technical designs, working blueprints (rabochiye chertezhi) are drawn to be used in actual construction work (they do not include the extensive economic information of the preceding documents). In order for a construction project to be included in the capital investment plan and for financing to be provided, approved cost estimate and technical draft documentation must be available by 1 September of the preceding year. If the project is based on standard designs or is not technically complex, the design estimate documentation is accomplished in one stage, the technical-working design (tekhrabochiy proyekt).<sup>1</sup>

Cost estimation is accomplished by means of official handbooks. Technical characteristics (in physical terms) are multiplied by established norms (physical-giving construction requirements-and then prices-giving costs). Standard designs are accompanied by standard cost estimates and are incorporated into the total. Cost estimates can also be developed from documentation of analog projects. Handbooks of estimating norms are differentiated not only by the specific productive characteristic of the object, but also by region.<sup>2</sup>

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<sup>1</sup> Ibid., pp. 18-20.

<sup>2</sup> Department of the Economics of Industry, op. cit., p. 39.

The estimating procedure covers costs for labor, materials, machinery, and administrative overhead. Norms for determining planned profit of the construction organization are also employed.<sup>1</sup> Cost-savings realized during construction constitute above-plan profits of the construction organization. The income of the design organization is not a direct function of the cost it estimates, but is rather a function of norms related to the volume and character of work it performs.<sup>2</sup>

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<sup>1</sup> Ibid., p. 39.

<sup>2</sup> Ionas and Reynin, op. cit., pp. 168-170.

#### IV PERFORMANCE PROBLEMS AND ECONOMIC REFORMS

The traditional Soviet growth model has relied heavily on extensive development of the economy--i.e. expansion of inputs as a source of growth of output. While the Tenth Five-Year Plan has placed increased emphasis on intensive development, that is, increased factor productivity, as a source of economic growth, the construction sector remains a central concern, not only as in the past, for the augmentation of the capital stock, but also for the reequipping of existing plant and the construction of facilities incorporating the most modern available technology. The results of the evaluation of the investment program of the Ninth Plan, as in the past, have found performance of the construction sector less than satisfactory. This determination is made by Soviet observers, by comparison of key indicators both with planned targets (and thus normed performance) and with the investment process as accomplished in the developed West. M. Zotov observes:

...the total period for design, construction, and start-up on the average for the economy all the same exceeds by 1.5 times the established norms which are already far from optimal and don't at all allow for the acceleration of scientific-technical progress. Accounts indicate that the diversion of resources in above-norm volumes of unfinished construction due to lengthy periods for the equipping of enterprises and objects and the extended period for the exploitation of newly commissioned capacity has served to significantly lower the effectiveness of capital investment in the Ninth Five-Year Plan.<sup>1</sup>

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<sup>1</sup> M. Zotov, "Effektivnost' kapital'nykh vlozheniy i kreditnykh otnosheniya v stroitel'stve", Voprosy ekonomiki, No. 4, 1977, p. 48.

Looking at U.S. investment data, V.P. Krasovskiy writes:

For the reproduction of a unit of productive capacity in the U.S., it is necessary to increase the volume of related capital investment over the volume of commissioned capacity by approximately 1.2 to 1.3 times. In the USSR, this linkage of resources is significantly higher. A rational organization of the investment process, reduction of the periods of capital construction, acceleration of the commissioning of new productive capacity, contraction of the turnaround time for huge capital investment--all this remains as one of the central problems of the development of the national economy of the USSR.<sup>1</sup>

Table 3 shows the comparison between normed or planned unfinished construction (that is the estimated cost of buildings and equipment put in place but not operational) and actual unfinished construction for 1973 by branch of industry. Delays, note Kvasha and Krasovskiy increase costs and on the average, the actual cost of construction exceeds the original confirmed estimate by 1.4 to 1.6 times.<sup>2</sup> Since the norms are the basis for planning the volume of capital investment, this situation causes not only problems for the current group of projects, but insures a shortfall of investment funds for newly initiated projects.

V. Isayev, First Deputy Chairman of Gosplan, reprising a critical article he published in 1973, wrote:

...the basic contracting ministries are not fulfilling plans for volume of construction--assembly work year after year. (For example, in 1975, Mintyazhstroy USSR fulfilled 95.2 percent of its plan, Minpromstroy USSR 93.5 percent and Ministroy USSR 95 percent). These ministries did not improve their work in 1976--plan fulfillment constituted, respectively, 93.4 percent, 91.6 percent, and 90.9 percent.

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<sup>1</sup> V.P. Krasovskiy, "Povyshats' effektivnost' kapitalovlozheniy; investitsionnyy protsess i yego sovershenstvovaniye," Ekonomika i organizatsiya promyshlennogo proizvodstva, No. 1, 1975. p. 17.

<sup>2</sup> Kvasha and Krasovskiy, op. cit., p. 53.

TABLE 3

ACTUAL VERSUS NORMED  
UNFINISHED CONSTRUCTION, 1973

Capital Investment	Volume of Unfinished Construction at the end of 1973 as a percent of Total Investment	Normed Unfinished Construction as a percent of Total Investment, 1973
Total, USSR Economy Including.	76.9	60
For "Productive" Objectives	80	65
Of this, by Branch of Industry:		
electric power	114	99
coal industry	136.1	106
oil and gas industry	70	53
ferrous metallurgy	104.5	92
chemicals and petrochemical industry	119.3	79-91
machinebuilding and metalworking	94.8	60-88
forest products, wood- working, paper	90.4	60-79
construction materials	92.2	79
light industry	56.1	58
food industry	67.4	63

Source: V.T. Robotov, Effektivnost' kapitalnykh vlozheniy v stroitel'stve, Stroyizdat, Moscow, 1976, p. 56.



On projects there were great losses of worker's time ...the productivity of labor in construction is growing slowly. For the five year plan [1971-75] it grew by 28.7 percent as opposed to the planned 37 percent.<sup>1</sup>

The Minister for Industrial Construction of the USSR answered critics of the construction sector:

...Builders have at their disposal new highly productive technology, effective materials, hardware, and construction elements, experience in the organization of production, and qualified cadres. All the same they cannot always cope with planned tasks. This is basically the result of shortcomings in planning and organization of construction production, outdated, in our view, economic principles, criteria for evaluating work and methods of stimulation... Planning organs sometimes allocate Minpromstroy USSR insufficient resources. As a result, projects do not receive materials on time, workers and technical forces stand still, and the technology and period of construction are violated... .

As analysis shows, almost three fourths of elements commissioned in violation of [normed] periods result from untimely deliveries of equipment, design estimate documentation, and allotment of construction sites or poor financing of construction. One fourth of these are not ready for exploitation on time through the fault of builders and assemblers.<sup>2</sup>

Although most Soviet and Western observers of the construction process in the USSR would agree with the statement of problems faced by the construction sector in obtaining required resources, the performance of construction organizations themselves is usually cited as the most serious cause of delays. Martin Kohn wrote:

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<sup>1</sup> V. Isayev, "Povysheniye effektivnosti kapital'nogo stroitel'stva," Voprosy ekonomiki, No. 2, 1977, p. 4. See also Isayev's article in Voprosy ekonomiki, No. 8, 1973.

<sup>2</sup> A. Tokarev, "Promyshlennoye stroitel'stvo v desyatoy pyatiletke," Voprosy ekonomiki, No. 3, 1977, pp. 11-12.

Among the factors peculiar to the construction sector which contribute to construction periods greater than planned, the one with the heaviest impact is the combination of the standard by which the performance of construction organizations is generally evaluated and the usual procedure [reformed since 1974] by which contractors are paid by their clients for work done.

The principal yardstick of plan fulfillment by construction organizations has been--and despite efforts to reform the system, remains--the value of work done, regardless of how much of this work represents completions... . There is, thus a strong incentive for construction organizations to forego finishing-work for more remunerative [material-intensive] work on the earlier stages of construction of other objects.<sup>1</sup>

It should be noted that Kohn found criticisms by Soviet authors of the use of this performance evaluator appeared very frequently throughout the 1950-65 period he examined, yet reforms were explored on a very limited, experimental basis. It was not until the mid-1970s that a reform of the payments system was accomplished (see preceding chapter) and that a widespread experiment with altered criteria for plan fulfillment was instituted.

The intention to reform the system of incentives for construction was established by a resolution of the Central Committee of the CPSU and the Council Ministers in 1969. It stated the decision:

to effect, beginning in 1970, the transfer of construction-assembly organizations...to a new system of planning and economic stimulation [as established in 1965 for industrial enterprises]...  
to establish that under the transfer of construction-assembly organizations to the new system of planning and economic stimulation of construction production:

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<sup>1</sup> Martin J. Kohn, op. cit., pp. 194-196.

(a)superior organizations confirm for construction-assembly organizations the following plan indicators: for construction production: commissioning, in the established order, productive capacity and objects of construction in accordance with confirmed designs and title lists of projects; volumes of construction and assembly work by object or stage of work completed in the planning year and delivered to the client, according to estimated costs.<sup>1</sup>

Yet in 1978, a deputy chairman of Gosstroy writes:

Nine years have passed since the making of the resolution by the CC CPSU and Council of Ministers of the USSR on 28 May 1969, but organizations working under new conditions of economic management fulfill only about 80 percent of the total volume of construction-assembly work. As a result, double planning of contract work continues. In capital construction, the tendency remains which leads to violations of planned periods for commissioning capacity and objects, to the growth in construction costs in comparison with the estimates foreseen.<sup>2</sup>

He then presents the results of the first large scale experiment with full transfer to the new system of planning, launched only in 1976, for the Ministry of Industrial Construction of Belorussia. The experiment was later extended to several other ministries of construction in Belorussia, Lithuania, and the Ukraine. Not only were plan fulfillments calculated in terms of finished construction delivered for operation, but payments were made to construction organizations only in accordance with this fulfillment, while unfinished work was financed by bank credits

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<sup>1</sup> Resolution of the CC CPSU and Council of Ministers, USSR, "O sovershenstvovanii planirovaniya kapital'nogo stroitel'stva i ob usilenii ekonomicheskogo stimulirovaniya stroitel'nogo proizvodstva", 28 May 1969 in Resheniya pvrtili i pravitel'stva po khozyaystvennym voprosam, v. 7, Politizdat, Moscow, 1970, pp. 440-441.

<sup>2</sup> V.G. Ivanov, "Otsenivat' deyatel'nost' podryadchika i zakazchika po konechnym rezul'tatam," Ekonomika stroitel'stva, No. 9, 1978, p.4.

extended. Plan indicators are also calculated for clients of construction as a measure of fulfillment of their plan for capital investment, insuring that resources identified and allocated for that purpose are appropriately utilized. The plan indicators for clients were also changed from volume of capital investment expended to volume of investment represented by commissioned objects, under this experiment, to provide increased incentives for clients to press for project completion.

While excellent results in reducing construction periods and unfinished construction under this experiment were reported in this article as well as many others, the limitations of the new system, given other shortcomings in construction planning and organization were indicated. While the new plan fulfillment measures were more than satisfied, because cost estimates used in forming targets were incorrect, many priority projects were not completed in spite of the overfulfillment of plan targets. In 1976 and 1977, the plan for "commodity construction output" was fulfilled by the Belorussian Minpromstroy at levels of 100.9 percent and 102.9 percent while 62 and 55 objects, respectively, were not delivered as planned.<sup>1</sup>

This observation indicates that the transformation of planning in construction is a complex process, involving not only the performance of the construction organization, but the entire interface of the construction process with all the facets of the investment process and the remainder of the economy. Thus the very cautious approach to reform despite the apparent rationality of the step. What is sought is a careful orchestration of planning, financing and incentive measures to insure that each participant in the process has an interest in optimal rates of completion at lower cost.

Incentives misdirecting client and contractor are not the only reasons that normed construction periods and estimated costs are exceeded. Supplies and scheduling of basic inputs are also an important source of delay. Adequate inputs for production are not a unique concern of the

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<sup>1</sup> Ivanov, op. cit., pp. 7-8.

construction sector, but rather are a chronic source of performance problems throughout the Soviet economy, due to overambitious planning (above levels required for what Western observers have called optimal tautness), and shortages of available manpower.<sup>1</sup> The construction sector may be somewhat more vulnerable than most however. As Kohn points out, the construction sector is heavily dependent on deliveries from other sectors, and failure to deliver required equipment can prevent the commissioning of otherwise complete construction, while shortages of critical materials can result, not only in a reduced flow of output as in industrial enterprises, but also may prevent completion of all later stages of construction (i.e. not only supply but scheduling can be critical). Moreover, construction materials requirements, he notes, are often non-recurrent, while traditional supply relationships in industry are very important for planning and maintaining lines of supply for producers.<sup>2</sup> It should also be noted that requirements for materials are planned on norms calculated for 1 million rubles of construction-assembly work performed. These norms do take into account the type of construction work involved, but not a variety of factors involved in requirements for particular sites.

B. Isayev observes that:

The system of norms developed plays a positive role in defining requirements for material resources. However, it has shortcomings which lead to imbalance in plans for production, capital construction and material-technical supply at various level of administration of construction. Included in norms for 1 million rubles at estimated cost of construction-assembly work are indicators of use of material resources on a representative object which in many cases does not correspond to the design decisions for buildings and structure either in construction element and architectural-planning decisions or in nomenclature and indicators of requirements for construction materials, their technical characteristics, since 5 to 7 years passes between the beginning of development of norms and their use.<sup>3</sup>

<sup>1</sup> See Holland Hunter, "Optimum Tautness in Developmental Planning," Economic Development and Cultural Change IX:4, Part 1 July, 1961, pp. 561-572.

<sup>2</sup> Kohn, op. cit., p. 213-215.

<sup>3</sup> V. Isayev, op. cit., p. 10.

It is hoped that in the development of the Automated System of Management that the subelement for calculation of norms will remedy this lag. However, as stated by the USSR Minister of Industrial Construction Tokarev for a variety of critical deliveries, even planned levels are not met by the construction materials and metalworking industries.<sup>1</sup>

Labor is another important constraint. It should be remembered that skilled labor is most important in finishing work as opposed to the more material intensive aspects of initial construction. While labor shortages may concern the economy as a whole, a Western expert on Soviet construction observes the sector's particular problem:

A chronic shortage of skilled workers persists in the USSR and construction has tended to be the entry point for unskilled farmers and youth into the industrial labor force. Once trained, workers tend to leave construction for more desirable employment.<sup>2</sup>

Another common source of construction performance problems is late and inadequate cost-estimate and design documentation. Despite long-standing regulations concerning the inadmissibility of construction start-up without complete documentation, Tokarev writes:

It is incorrect in our view that the practice exists of inclusion in plans of construction ministries of objects not having, within the normed period, design-estimate documentation, under guarantees by the client ministry. Such guarantees are often violated, planned projects not delivered for exploitation on time, resources frozen and dispersed.<sup>3</sup>

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<sup>1</sup> Tokarev, op. cit., p. 11-12.

<sup>2</sup> Willard P. Smith, "Housing in the Soviet Union-Big Plans, Little Action," Soviet Economic Prospects for the Seventies, Joint Economic Committee of the Congress, USGPO, Washington, 1973, p.404.

<sup>3</sup> Tokarev, op. cit., p. 12.

Moreover, while designers are rewarded for economical new designs, if they are confirmed for use, the designers bear no responsibility for actual applicability for the construction site and later they may prove to be underestimates, possibly lacking required components for the actual projects.

These widespread shortcomings in control over the design-estimate process seem remarkable in light of the intricate confirmation and documentation procedures outlined in the preceding chapter. The very intricacy of those procedures may be partly at fault, however. The demands on the resources of design organizations and those who exercise quality-control over their work apparently outweigh the resources. The plan for design work is based on the future plan for capital investment. Yet clients submit design work for future projects far in advance of their consideration in the investment plan and for more projects than will be confirmed for the plan. G. Shiryaev notes that design work for large enterprises continues for 3 to 5 years and more, and thus:

Only in 1975, designs for construction of future projects were undertaken for more than 5,000 projects (each with an estimated cost above 3 million rubles), while only about 500 of them were included in the plan for capital investment.<sup>1</sup>

He also notes that due to the system of confirmation of documentation, 40-60 percent of the time required to complete design-estimate documentation is spent on various agreement, review and confirmation processes. The system of documentation and confirmation from TEO to blueprints requires frequent duplication of effort to make minor changes at each stage, in spite of the fact that it is understood revisions will take place after construction commences.<sup>2</sup>

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<sup>1</sup> G. Shiryaev, "Uluchsheniya proyektno-smetnogo dela vazhnaya narodnokhozyaystvennaya zadacha", Planovoye khozyaystvo, No. 1, 1977, p. 35.

<sup>2</sup> Ibid., p. 30-31.

A last, but oft repeated, source of construction delays is the dispersion of resources for construction by the proliferation of new projects, without account of either the impact on construction in progress or the resources available in the future. This relates not so much to the construction organization, but rather to the clients in the investment process. Kohn sees the attempt by ministries to maximize the amount of capital investment which they are allocated as a response to over-taut planning.<sup>1</sup> That is, in response to the demands on their performance, ministries turn to new capacity, rather than improved efficiency, to solve them. It can also be seen that ministries, in evaluating claims for investment resources submitted from below, rather than weigh competing claims, attempt to maximize the resources to resolve disputes by incorporating as many projects as possible. Lower units attempt to ensure the acceptance of their plans through underestimating costs and construction periods. There is some complacency about this fact on the part of ministries, due to the knowledge that once projects are begun, additional resources are not likely to be withheld. Kvasha and Krasovskiy note:

Overstatement of the benefits of a construction project and the underestimation of the cost of its achievement is a common means for its defense in a wide variety of cases. At the same time, there is always the assurance that once the project is accepted, the initially confirmed estimate will be reviewed in the course of construction for the introduction of supplements and corrections in the design on account of new prices and evaluations and other changing and unforeseen conditions.<sup>2</sup>

It would seem that new capacity in the pipeline is desired by enterprises and ministries as a reserve to be called on in case of additional performance pressures, as are large inventories of material

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<sup>1</sup> Kohn, op. cit., p. 209ff.

<sup>2</sup> Kvasha and Krasovskiy, op. cit., p. 53.



inputs. This is indicated because it is often observed in the literature that once a project is confirmed, incentives are not strong for the client to press for rapid completion. With the new capacity in place, plan targets are raised. The assimilation of new capacity, moreover, incorporates a considerable risk that new production targets may not easily be met in light of new production techniques to be mastered. The old reliable facilities may be more comfortable for the manager. In addition, charges for financing construction on credit are minimal and are not due for repayment (principal and interest) until after the new project or new capacity is operating.

Thus the performance problems of the construction sector relate to the difficulty in generating a unified set of priorities and objectives on the part of the center and the periphery, as well as the result of overambitious planning. While these two sources of performance problems are not unique to the sector, combined with the peculiarities of the organization of construction activity and the central importance of construction in the achievement of the economic goals of the center, they amount to a high priority problem in peacetime and are particularly important for consideration of potential recovery performance.

## V SOVIET CONSTRUCTION PRACTICES AND THE POTENTIAL POSTATTACK ENVIRONMENT

In this chapter, the material presented in the foregoing survey of Soviet construction practice will be assessed in the light of SRI's ongoing research into the nature of Soviet potential postattack economic recovery. The assessment draws implications in two directions:

- implications of construction practice and performance for the nature of the recovery environment
- impact of assumptions about the recovery environment for the construction sector.

Since a detailed discussion of the likely nature of the Soviet post-attack environment is beyond the scope of this report, the features of the postattack environment are drawn from a current treatment of the economic dimension, developed as a part of SRI's Soviet and Comparative Economics Program.<sup>1</sup> The discussion is organized around a set of characteristics of economic processes in recovery:

- continuity of processes from peacetime through recovery
- the rôle of enhanced-command mechanisms
- the nature of labor discipline
- information system requirements
- formulation of goals
- impact of initial conditions on processes
- the role of the military.

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<sup>1</sup> See M. Mark Earle, et al., Observations on the Measurement of Soviet Economic Processes During Mobilization and Recovery, SSC-IN-78-17, December, 1978.

In the concept of the process of recovery employed here, there is a progression of environmental phases dictated by leadership perceptions of the role of the economy in meeting the needs of the nation:

- mobilization--shifting away from the meeting of peacetime needs to support war-fighting capabilities
- trans-war--absorption of shock with a minimum of damage and maintenance of supply to the military
- survival and reorganization--following damage limiting operations, the restoration of economic units to the point where production above subsistence levels can begin
- enhanced command phase--production to meet immediate needs of the civilian economy and defense together with some longer range recovery goals
- transition--production to meet mid-terms goals under somewhat relaxed constraints
- recovered economy--return to production within the framework of long-range goals for a peacetime economy.

The operational considerations for the construction sector in meeting this range of objectives and impact of the environmental characteristics on practice and performance are treated below.

A. Continuity of Processes

Given the nature of pre-planning accomplished by Soviet civil defense programs, it is likely that economic processes, in so far as practicable, would exhibit a considerable degree of continuity from peacetime through the recovery period. From the point of view of the construction sector, however, this would likely have to be qualified due to the very different nature of the sector's tasks from phase to phase.

In mobilization, construction tasks with any protracted horizon would certainly lose importance. It could be expected that construction crews would be diverted to hardening of existing facilities which could best be organized by the industrial enterprises themselves with their existing civil defense management in charge. Likewise, trans-war tasks--damage-limiting and short-term capital repair, would also likely fall to the civil defense apparatus on an enterprise-by-enterprise and locally directed basis with construction organizations at their disposal.

Survival and reorganization would encompass continued damage-limiting and expedient restoration tasks. However, this period would also involve the reassembling of a construction base to accomplish larger-scale tasks. How would the construction effort be organized? Looking at the institutional maze and complex information flows involved in the pre-war process, it would seem that the burden of planning and administering such a process would be beyond the capabilities of the central apparatus during survival and reorganization. It is also likely that the nature of the tasks during that period would not lend themselves to such a centrally directed organization formulating detailed tasks for the periphery.

It might be suggested, then that the most likely means to accomplish construction tasks in the survival and reorganization phase is a return to the organizational structure existing during the early years of the planned period--the own-force method (khozyaystvennyy sposob) in which construction is accomplished by the industrial enterprises and ministries themselves. Planning at this stage is hypothesized to be largely based on contingency plans formulated pre-war. In combining construction work with other tasks of the industrial enterprise, planning and coordination work are significantly reduced. The process of establishing a construction base for recovery, then, would involve, as in the 1930s, the assembling of construction forces into permanently established organizations devoted to construction work.

It could be expected, then, as recovery proceeded from the enhanced command to the fully recovered stage, that the development of organizational structure of construction activity would undergo elaboration much as it did from the 1930s on. That is, as expansion replaced reconstruction as a primary goal, as the scope of priority projects widened, and as the technological content of the work on new facilities increased, the need for large-scale, specialized construction organizations, careful planning and control of resources, and coordination of construction work, materials production, and machinery deliveries would call for the reinstitution of the complex of planning and control mechanisms existing pre-attack.

Thus, in hypothesizing a continuity of economic processes, we do not mean for the construction sector that pre-attack mechanisms would apply precisely to the entire post-attack period. Rather, it is suggested that as the demands of the economy on the construction sector develop along the recovery path, it is likely that they will be met by the institution of practices analogous to those pre-existing in peacetime.

Along these lines, it is interesting to note an article by V. Vitovskiy suggesting the need to create a body to organize a construction project representing all the various interests, but with the express goal of completing a high priority project on time. It provides a description of the organizational approach adopted during World War II to quickly establish production capabilities in the East. He writes:

Thus, in the period of the Great Patriotic War, the method of wholistic [tselevoye] management was utilized in order to speed the reconstruction of enterprises rebased from the European part of the country to the East. Under this, the general contractor by agreement with subcontractors and the client created a leading group from the staff workers to whom all participants in construction were subordinated operationally for the period of construction. Operational subordination meant that

without the authorization of the leading group, neither workers, nor machinery, nor material-technical resources could be removed from the project.<sup>1</sup>

While this mechanism is a step short of a return to non-contractual means, it does illustrate that in an emergency situation in order to achieve rapid attainment of goals, principles of organization may be adapted, but based on existing institutions. The author notes that this management system was applied in later years in the case of very large, high priority construction projects.

B. The Role of Enhanced Command Mechanisms

It is evident from the discussion of the intricate controls instituted by central planners over the entire capital investment process, that a great deal of effort must be expended by the center to insure the enforcement of central priorities in the selection of projects and the bringing to bear of resources for their completion in the established order. In the initial stage of recovery, SRI research has indicated that the role of central command in the allocation of resources is likely to be enhanced throughout the economy. In the survival and reorganization stage, as was discussed in the preceding section, it is likely that the administration of reconstruction efforts would be merged with that of industrial production. The direction of construction work would be somewhat less complex in that stage because it would be aimed at restoring the least damaged facilities first (although these decisions would require adequate information on the surviving capital stock) and construction of

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<sup>1</sup> V. Vitovskiy, "Sovershenstvovaniye upravleniya kapital'nym stroitel'stvom," Voprosy ekonomiki, No. 6, 1977, pp. 31-32.

facilities for the labor force would center around the need to support workers at restored industrial sites. After these initial tasks are accomplished, however, and an independent construction base is being established, central control over resources must be reasserted.

Thus it could be expected that the role of centralized investment would once again be strengthened relative to the post-1965 (Kosygin reform) situation. Enterprise control of revenues would be reduced to incentive funds and formerly discretionary accumulations would be paid to the state budget. The ability to confirm title lists of projects for inclusion in investment and construction plans currently given by the USSR Council of Ministers to its ministries and the union-republics would be reserved to the center for all but very small local projects. It should be remembered that the 1957 regionalization of economic administration was evidently proved unsatisfactory in the case of investment and construction-work decisionmaking even before that of industrial production. With the uncertainty of supply even greater in recovery than peacetime, the desire of local producers to be as self-sufficient as possible would be certain to result in the dispersion of resources in duplicative efforts, if local (or even "empire-building" ministries) were to have a significant role in allocating investment resources.

Maintaining incentives to construction organizations to act in accord with central priorities would perhaps represent an even more difficult problem in recovery than in the pre-attack environment. It should be recalled that under the Belorussian experiment, discussed in the previous chapter, lack of accurate cost estimates hampered the ability to construct plan indicators for finished construction that properly reflected central priorities for completing projects. Difficulties in providing adequate financial indicators can be expected to be greater in recovery, given a much weaker connection between the base of experience for norming construction work and current conditions. It would seem that volumes of construction work performed would have

to be relied upon as plan fulfillment indicators, with bonuses (punishments and rewards, not necessarily financial, may be much more effective levers in the postattack environment) paid only upon completion of a specific list of objectives. The "leadership groups" as described by Vitovskiy (see Section A above), if constituted, could be used to decide on evaluators of construction performance, if that group were actually held responsible for completions.

It has been obvious in the comparison of the system of regulations and controls and the critique of performance problems that procedural requirements are often violated through the mutual agreement of the parties. This is partially due to the commonality of interest in expediting the approval of projects and partly in recognition of the shortcomings of normative materials and the time-consuming nature of the procedures. It has also been noted that changes in procedures can be instituted only very slowly due to the complex indirect effects which entail the entire investment process. In the initial phase of recovery, if institutional procedures are to play a positive role in enforcing central priorities in the carrying out of investment programs, it is only through close supervision by the center, most likely via the Party apparatus, that institutional procedures can be adapted in ways that would be deemed appropriate by it. As recovery proceeds, material constraints on investment plans are relaxed and objects of investment will multiply and involve a broader range of economic objectives. This development to some extent obviates the need for direct intervention by the center and increases the costs both in terms of resources required and efficiency of information transfer. It should be expected then, that as in the rest of economic activity, direct intervention by the center in investment and construction activity would be relaxed as recovery proceeds, with increased reliance on economic incentives and more normal hierarchical control in carrying out plans.



### C. Labor Discipline

It was noted in the preceding chapter that the availability of skilled labor has been a continuing problem in construction performance. Following the attack, particularly if evacuation is effected as envisioned by Soviet civil defense plans, reserves of displaced labor will be available for reconstruction work.

As reorganization, and then initial recovery, proceeds however, it can be anticipated that a pattern of labor mobility, in the absence of strict labor discipline measures, would develop as has been observed in peacetime. That is, construction crews would chose to work at enterprises after the construction is completed rather than relocate to a new construction site. If facilities were constructed to support the work force at the completed project, the attraction in the postattack environment would be very strong.

As construction work progressed from sites having sustained relatively light damage to areas of heavier concentrations of damage, availability of labor, especially skilled labor much in demand at production facilities, would become increasingly problematic. It should be expected, then, that mandatory labor assignments would be required in the construction industry even more than in other sectors, and for a greater share of the recovery period. It might also develop that workers at production facilities without high priorities would receive secondary assignments at construction sites (as was done in World War II recovery).

### D. Information Requirements

As was documented in the chapter describing current Soviet construction practice, the flow of information involved in project selection, planning, plan implementation, and financing for construction work is time-consuming and labor intensive. Plan decisions taken in

the absence of full information on progress in plan fulfillment are blamed for serious performance problems. Long lead times are required for planning and designing large projects. Coordination of construction work with production and delivery of material inputs and equipment is not satisfactorily accomplished.

In reorganization and early recovery, the most critical information is likely to be data on the extent and profile of surviving capital stock and available labor. Construction materials and equipment (repairable or perhaps even undamaged despite the destruction of the facility) are likely to be available locally in the form of damaged enterprises. It is likely, however, that as in the estimation of the cost of suggested projects in the peacetime economy, reporting by the periphery on this essential data would be distorted. While reporting on the time and cost involved in restoring facilities would most likely be underestimated in an effort to gain approval for undertaking projects, the extent to which deliveries would be required above what is locally available would be overstated after approval, to insure adequate supplies. Once resources had been expended for the execution of a project, arguments for additional supplies of material inputs would be very compelling in the postattack environment, given the importance of added capacity in the immediate future. Again, this argues for the need of very close supervision by the center in construction activity in the early phases.

To the extent that standardized plans are available for application in reconstruction and initial expansion, long lead times can be reduced for design work. While Soviet literature notes that use of standardized designs has grown considerably in recent years, it is also noted that progress is less than anticipated and that the Soviets could benefit from the adoption of modular industrial design techniques now being used widely in the West. The preservation of design documentation in general would be of critical importance in speeding reconstruction,

although much of the normative information would be even less relevant than in peacetime. Preexisting cost estimates, even though scarcity pricing has not been Soviet policy, would not prove very useful in the postattack environment, while physical quantities would need careful reexamination. Much that is essential in a peacetime production facility can be eliminated for expedient production and new forms of substitution for scarce construction materials (and labor for equipment) would have to be considered.

As was noted earlier, economic controls, heavily dependent on information systems, for construction plan implementation, would, in the earlier periods, have to be replaced by subjective evaluations of representatives of the center possibly coupled with gross performance indicators. Central representation is probably also required for data gathering and verification for plan formulation as well as fulfillment reporting. As information channels are restored and a data base assembled, more normal center/periphery communications may be reestablished. As investment goals are broadened beyond immediate high priority tasks, centralization of decisionmaking and analysis of information becomes too costly and hierarchical systems of decentralized planning and confirmation procedures would be restored, probably much as they now exist.

#### E. Formulation of Goals

As part of SRI's research on potential Soviet postattack recovery, a political economic game was conducted to explore the nature of goal formulation--particularly the integration of political, military, and economic factors in economic decisionmaking.<sup>1</sup> The framework for

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<sup>1</sup> See M. Mark Earle, et al., Executive Summary: A Political-Economic Game Exploring Soviet Plan Formulation for Postattack Economic Recovery, SSC-TN-4986-2, December, 1978.

the decisionmakers was derived from a strategic view of Soviet goals in fighting and surviving a nuclear war.<sup>1</sup>

Observations from the game indicated that if the international environment postattack was perceived as hostile and threatening, then the decisionmakers would have a short-run perspective stressing the immediate reconstitution of military capabilities over long-run economic recovery considerations. A less threatening perception, however, could engender priority for investment in long-run recovery of national economic capabilities. A mix of long-run and short-run objectives was deemed to be the most likely outcome for postattack goal formulation.

The short-run objectives of reconstituting military capabilities would entail a narrow range of priorities and provide for clear-cut instructions in construction activity. These objectives could be well-served by direct supervision of representatives of the center as has been described above. It is the long-run objective of restoring national economic capabilities that would require the reestablishment of a permanent construction base. This phase of activity would require, increasingly as recovery proceeds, the necessity of adopting long-range plans to objective conditions, the coordination of complex participation by economic units with diverse interests in performance, and the need to reconcile competing and proliferating claims on investment with available resources when the question of clear priorities is no longer readily answered. It is in the meeting of these long-term recovery objectives that construction sector performance problems may serve as a constraint. From the consideration of reform proposals and reform attempts, it would not appear that the problems of late delivery of construction would be easily solved with the central concerns being, as now, the provision of appropriate incentive and the maintenance of central control over the process.

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<sup>1</sup> See R.B. Foster, The Soviet Concept of National Entity Survival, SSC-TN-7167-1, March, 1978.

#### F. The Impact of Initial Conditions

While much of the analysis undertaken with respect to the potential Soviet postattack environment can be assessed for a variety of war scenarios, the initial conditions for recovery in terms of surviving capital stock and labor will depend heavily on the specifics of the exchange and the effectiveness of civil defense measures (evacuation, industrial hardening, etc.). For any discussion of recovery principles it must be assumed at the outset, however, that the level of damage will not be such as to threaten the viability of the economy--i.e. following a period of survival and reorganization, production units can begin to function again and may be viewed as operating in a total system context.

The tasks of the Soviet construction sector, and thus its organization and performance characteristics, will be closely related to these initial conditions--the profile of surviving capital, by branch and region, the availability of stocks of material and equipment, and the availability of labor, in later stages of reconstruction, especially skilled labor. As was indicated in the preceding section, the tasks and performance will also depend on the mix of short-term and long-term objectives. Political factors are not only paramount in the determination of objectives, but also in maintenance of control by the center. Effective control will depend not only on material resources and surviving cadres, but also on the ability of contingency planning accomplished pre-war to cope with the objectives and initial conditions pertaining postattack.

Having assumed a degree of both economic and political viability, it is certain that postattack economic objectives, especially in the short-to mid-term will be modest relative to pre-war levels of production activity. It is likely that there will exist a large stock of capacity that can be restored more readily than new capacity can be constructed,

with a transfer of usable capital equipment and material from more heavily damaged facilities to reconstruction sites in accordance with central priorities for the reestablishment of production capabilities. This transfer can be accomplished not only within a strict categorization of facilities, but within limits, even across branch lines. These restoration efforts could be accomplished to a significant degree with close local supervision by representatives of the center and mobilization of local resources. With clearly defined priorities, local control by the center, and a minimization of interregional and interbranch coordination of deliveries, construction sector performance problems identified in the pre-attack environment are not likely to play a major role in constraining early recovery efforts.

With more concentrated damage, by region and by branch, even though surviving resources might be greater in the aggregate, the problems of organization and performance of construction might be expected to be more serious. The same would be true as priorities widen and objectives take on a more long-term character. This is true because of greater coordination and planning of activity by units geographically and bureaucratically separate. If production facilities must be constructed rather than reconstructed on the basis of existing designs, the whole maze of central controls will be needed to generate an effective investment program. Claims on resources would be made not only by other construction projects based on varying degrees of restorability, but also by operating facilities for their production and expansion efforts. Questions of choice of technology would be more difficult, balancing long lead times for the meeting of long-term capability requirements with short-term advantage provided by existing designs and possible stocks of equipment.

Thus, the impact of initial conditions on construction sector performance is twofold. The first impact is on the availability of resources. The second is on the nature of the tasks involved and therefore, at what point in the recovery process, pre-existing

performance problems can be expected to act as a brake on the accomplishment of recovery goals via added capacity.

G. The Role of the Military

The Soviet military could play two roles vis-a-vis construction activity in postattack recovery, with opposing impact on the expansion of production capabilities. The first role is as a competitor for resources. The resource competition is not viewed here to be between military and civilian production. The end-uses of production will be a function of central priorities and a clear line could not be drawn between construction activity along these lines, given the possibility of conversion of facilities from the meeting of one set of outputs to that of another, as well as the joint utility of many forms of output. The competition would be, rather, for labor force between construction and military operations and maintenance, for construction materials and fuel between military construction and construction of production facilities, and for output of machine-building between military procurement and construction equipment, spare parts, and producer's goods for expansion and restoration of capacity. The role of the military as competitor in this narrow sense will be more important given the immediate nature of an external threat and heavy damage to military capabilities.

The second role would be more important given greater concerns of the military and central leadership with long-term capabilities, i.e. a less immediate external threat and greater surviving military capabilities. That role is the activity of the military as an adjunct of the construction base, or perhaps even as its vanguard. Such a role is fulfilled in the peacetime economy by the Soviet construction troops, who undertake not only military construction, but also construction of primarily civilian facilities. It is noted by Western observers that military constructors are often called upon for this latter work in cases where high quality work and rapid completion are required. The discipline and technical resources of the construction

troops could play an important role in initial recovery and serve as a model for organization of local efforts. As increasingly specialized completion work is required, however, this role could be expected to diminish.

#### H. Conclusion

This study of the construction sector in the postattack environment can be seen to be important not only due to its critical role in recovery efforts, but also as a case study of the evolution of performance problems identified from peacetime experience as recovery proceeds. The general problems of control and incentives remain in the postattack environment, but are likely to be more readily solved in earlier periods due to narrower priorities, shorter-range objectives, and lesser burdens of coordination and planning. Like the economy as a whole, the construction sector would benefit from civil defense measures, both protection and pre-planning. Lastly, initial conditions, both political and in terms of surviving resources, will critically impact on sector performance and sectoral tasks.